U.S. Environmental Protection Agency
Office of Waste Programs Enforcement
Contract No. 68-W9-0009

YAKIMA
AGRICULTURE RESEARCH LABORATORY
YAKIMA, WASHINGTON

OPERATION AND MAINTENANCE INSPECTION

DATA VALIDATION REPORT

TES 12

Technical Enforcement Support at Hazardous Waste Sites Zone IV Regions 8, 9, and 10

prc
PRC Environmental Management, Inc.

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DATA VALIDATION REPORT

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, D.C. 20460

Work Assignment No.	:	12R10047
EPA Region	:	10
EPA ID. No.	:	WAD 120513957
Date Prepared	:	October 10, 1991
Contract No.	:	068-W9-0009
PRC No.	:	212-R1004709
Prepared by	:	PRC Environmental Management, Inc. (Harry Ellis)
PRC Project Manager	:	Gary Bruno
Telephone No.	:	(206) 624-2692
EPA Work Assignment Manager	:	Marcia Bailey
Telephone No.	:	(206) 553-0684

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1.0 INTRODUCTION

U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) case number 16402 consists of water samples from the Yakima Agriculture Research Laboratory (YARL) analyzed for total and dissolved metals, volatile organic compounds, pesticides, and polychlorinated biphenyls (PCBs). In additional, case number 4755 consists of water samples from YARL analyzed by Versar, Inc. for chlorinated herbicides and organophosphorus pesticides.

2.0 BACKGROUND

YARL is a U.S. Department of Agriculture facility in Yakima, Washington that has been used for pesticide research since 1961. For many years, wastes including residual pesticide solutions were disposed of by pouring them on the ground or through a septic tank to a drainfield system. The facility is regulated by EPA under the Resource Conservation and Recovery Act. As part of the regulatory process, YARL installed a groundwater monitoring system consisting of seven wells.

PRC conducted an operation and maintenance inspection of YARL on May 6, 1991, collecting split samples from upgradient well MW-D and downgradient wells MW-A, MW-E, MW-F, and MW-G. PRC also collected a trip blank and a transfer blank for the volatile organic assays and a set of duplicate samples from well MW-A for all assays.

3.0 LABORATORY CONTROLS

Skinner and Sherman Laboratories, Inc. performed the inorganic analyses. In every sample, the spike recovery values for selenium and thallium were below control limits. Neither element was found in any sample; the actual sample detection limits may be somewhat higher than the tabulated 3 µg/L (selenium) and 2 µg/L (thallium). For samples MJF 414 and MJF 148, the arsenic spikes were slightly above the control limits. However, no data qualifiers are necessary. All other parameters were within control limits.

Gulf South Environmental Laboratory, Inc. (GSEL), performed the analyses for volatile organic compounds and pesticides and PCBs. All laboratory controls in the volatile assays were within required limits except the matrix spike recoveries of benzene and toluene, which exceeded quality control criteria in the duplicate assay. Similarly, one pesticide and

1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC) received Work Assignment No. 12R10047 under the Technical Enforcement Support (TES) Contract No. 68-W9-0009 from the U.S. Environmental Protection Agency (EPA) to conduct an Operation and Maintenance (O&M) inspection at the Yakima Agriculture Research Laboratory (YARL), in Yakima, Washington. As part of the O&M inspection of the YARL groundwater monitoring system, PRC collected split groundwater samples on May 6, 1991 for analyses. PRC validated the Contract Laboratory Program (CLP) analytical data for case number 16402 in accordance with EPA (1988a,b). The case consisted of environmental samples collected from upgradient well MW-D and downgradient wells MW-A, MW-E, MW-F, and MW-G, a trip blank, and a duplicate sample from well MW-A. The seven samples were assayed for total and dissolved metals, volatile organic compounds, pesticides, and polychlorinated biphenyls (PCBs). PRC also validated Versar, Inc. analytical data for case number 4755 in accordance with EPA (1988a). This case consisted of seven water samples from YARL assayed for chlorinated herbicides and organophosphorus pesticides.

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3.0 LABORATORY CONTROLS

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within required limits except the matrix spike recoveries of benzene and toluene, which exceeded quality control criteria in the duplicate assay. Similarly, one pesticide and PCB target compound, endrin, exceeded recovery criteria in its matrix spike sample. Since none of these compounds were detected in the samples, no data qualifiers are necessary.

Versar Laboratories, Inc., performed the analyses for organophosphorus insecticides by SW-846 Method 8140 and for organochlorine herbicides by SW-846 Method 8150. Several of these samples had low matrix spike recovery values, but no data require qualification. All other control measures were within the acceptable range.

The widespread nature of the matrix spike recovery problems might be explained by matrix interference, by other chemicals affecting either the extraction or analysis of the target compounds, or by the reaction of target compounds with the analytical system. Matrix spike recovery problems are common with highly contaminated samples. Matrix interferences might also explain the inorganic assay results, since the samples contained high concentrations of calcium, magnesium, and sodium. However, matrix interference cannot explain the organic assay results. The chromatographs are extremely clean, and most of the indicated response resulted from the internal standards added during the assay procedures. The likely explanation is that the observed results show typical random variation which, in a few cases, were outside the prescribed limits.

4.0 FIELD CONTROLS

Generally, the field duplicates were in good agreement. The only exception was the total lead concentration results in samples MJF 144 and MJF 146. The difference in lead concentrations may have resulted from the duplicate sample (MJF 146) containing particles with a high lead content.

The volatile organic trip blank, JG 889, contained traces of methylene chloride, a common laboratory contaminant. In accordance with EPA procedures, all samples with up to 10 times the trace methylene chloride concentration are considered blank contamination and are qualified U, that is, not detected. The only affected sample was JG 888 from well MW-E, for which the laboratory's result of 4 μg/L was changed to 5 μg/L U, that is, not detected at the contract required quantitation limit (CRQL).

GSEL reported that sample JG 890 (transfer blank) was not received at the laboratory although the blank sample was listed on the accompanying chain-of-custody form. GSEL noted

other items for sample JG 889 (trip blank) including a disagreement in the collection time (marked on the chain-of-custody form but not on the container label), a delay between collection and receipt of the sample at the laboratory, and the existence of headspace in the two 40-ml volatile organic analysis vials. The trip blank was poured by the EPA Regional Laboratory in Manchester, Washington prior to PRC conducting the O&M inspection. Also, GSEL noted that one 80-ounce bottle each for samples JG 886 and JG 885 (out of two 80-ounce containers collected for each sample) arrived broken at the laboratory.

4.0 FIELD RESULTS

In general, the YARL samples were relatively uncontaminated. Inorganic results, summarized in Table 1, show that the samples contained common cations of calcium, magnesium, and sodium at concentrations in the upper ranges for potable water. The more toxic heavy metals, such as thallium, were undetected; arsenic and lead were present at low concentrations. With the exception of the unusual lead results in the duplicate sample from well MW-A, there were no important differences between the total and dissolved pairs, indicating negligible particulate contamination. All monitoring wells had similar concentrations, except for MW-E, which had the highest concentrations of potassium and the lowest concentrations of the other major elements.

The organic assay results listed in Table 2 show traces of acetone, chloroform, tetrachloroethene, and endosulfan sulfate in most samples. Acetone is a common laboratory contaminant. Tetrachloroethene was found at a higher concentration in upgradient well MW-D than in any downgradient well. These two contaminants may be disregarded unless they are regularly found in other samples. Chloroform and endosulfan sulfate were absent in the upgradient well but were found in most of the downgradient wells. Despite their low concentrations, these compounds should be considered site-related contaminants.

The analyses for organophosphorus insecticides and organochlorine herbicides were negative. If the insecticides were present at an earlier time, they most likely hydrolyzed to relatively innocuous products. If the herbicides are present, they probably are bound to soil particles and have extremely low mobility.

6.0 CONCLUSIONS

The assays were well done; no significant qualification of results is required. The only obvious site contamination is the extremely low concentrations of chloroform and endosulfan sulfate found in almost all monitoring wells.

7.0 REFERENCES

EPA, 1988a. Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses. U.S. Environmental Protection Agency, Hazardous Site Evaluation Division, Washington, D.C.

EPA, 1988b. Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses. U.S. Environmental Protection Agency, Hazardous Site Evaluation Division, Washington, D.C.

TABLE 1
INORGANIC ANALYTICAL RESULTS, YAKIMA AGRICULTURE RESEARCH LABORATORY
(µg/L)

Sample Location:	MW-D		MW-A		MW-A		MW-E		MW-F		MW-G	
	T	D	T	D	T	D	T	D	T	D	T	D
Contract Laboratory Program Number:	MJF123	MJF124	MJF144	MJF145	MJF146	MJR147	MJF413	MJF414	MJF148	MJF149	MJF125	MJF143
Aluminum	14.0U	14.0U	14.0U	14.0U	28.8	15.1	14.0U	14.0U	17.2	31.4	14.0U	19.5
Arsenic	7.2	7.2	5.2	5.6	4.7	4.9	3.0	2.8	5.4	6.1	6.3	6.9
Barium	21.6	21.1	20.5	25.2	20.0	20.6	24.2	24.6	18.0	17.7	18.3	18.2
Calcium	71,400.0	74,500.0	79,800.0	78,500.0	79,100.0	78,600.0	57,900.0	55,100.0	74,300.0	76,400.0	75,700.0	71,400.0
Copper	4.3	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U	4.0U
Iron	34.1	8.0U	12.1	8.0U	20.1	13.2	10.4	8.0U	11.5	8.0U	8.0U	8.0U
Lead	5.5	2.7	2.7	3.4	17.2	3.0	1.0U	3.0	2.9	4.1	3.0	3.9
Magnesium	44,300.0	45,600.0	44,000.0	43,600.0	43,100.0	42,500.0	27,200.0	26,800.0	43,400.0	44,600.0	46,700.0	44,900.0
Potassium	3,290.0	3,320.0	4,190.0	4,190.0	4,070.0	4,020.0	4,790.0	4,800.0	3,440.0	3,550.0	3,550.0	3,570.0
Sodium	67,200.0	68,600.0	65,800.0	65,400.0	63,100.0	62,000.0	30,100.0	30,500.0	59,900.0	61,700.0	67,300.0	65,600.0
Vanadium	66.6	68.0	52.2	52.2	50.8	54.4	26.5	27.1	59.1	60.5	67.7	65.0
Zinc	11.3	8.7	7.0U	7.0U	7.0U	21.7	7.0U	7.0U	9.1	7.0U	7.0U	7.0U

Notes:

Metals not listed were not found in any samples.
T = Total metals.
D = Dissolved metals (sample filtered in the field).
Qualifier: U = Not detected; listed value is the sample detection limit.

TABLE 2

ORGANIC ANALYTICAL RESULTS,
YAKIMA AGRICULTURE RESEARCH LABORATORY
(µg/L)

Sample Location:	Trip Blank	MW-D	MW-A	MW-A	MW-E	MW-F	MW-G
Contract Laboratory Program Number:	JG889	JG879	JG885	JG886	JG888	JG887	JG884
Volatile Organics							
Methylene chloride	2J	5U	5U	5U	5U	5U	5U
Acetone	10U	10U	10U	10U	4J	5J	10U
Chloroform	5U	5U	2J	1J	1J	2J	3J
Tetrachloroethene	5U	3J	5U	5U	5U	1J	5U
Pesticides and PCBs							
Endosulfan sulfate	NS	0.10U	0.20	0.17	0.10	0.10	0.10

Notes:

Chemicals not listed were not found in any samples (including all target analytes in the organophosphorus pesticide and chlorinated herbicide assays).

Qualifiers: U = Not detected; listed value is the contract-required quantitation limit (CRQL).
J = Estimated value; most commonly the chemical was found at a concentration less than the CRQL.
NS = No sample.